

CLAIMS

I claim:

1. In a plasticized thermoplastic elastomeric product selected from the group consisting of (a) a vinylaromatic-polyolefin polyblock copolymer,
5 optionally hydrogenated to include a block of a mono(lower)olefin, and, (b) a thermoplastic vulcanizate,
the improvement wherein (a) and (b) each have uniformly distributed therewithin, polybutene fluidizable under melt-blending conditions of (a) and (b), the polybutene selected from the group consisting of (i) a homopolymer of
10 polyisobutylene and (ii) a copolymer of isobutene and butene, butene repeating units being present in a minor molar proportion;
the amount of polybutene being sufficient to provide the elastomeric product with a hardness in the range from Shore A 30 to 90 and an oxygen-permeability less than 40,000 cc.(2.54 μ m)/m².day.atm at 23°C;
15 (a) having a number average molecular weight ("Mn") in the range from about 40,000 to 1,100,000 and (b) having a tensile strength at 100% elongation in the range from about 0.5 to 10 MPa and specific gravity in the range from 0.9 to 0.99.
- 20 2. The product of claim 1 having a hardness in the range from Shore A 40 to 80 and a thickness in the range from 0.1 mm to 10 mm, and (a) is at least partially hydrogenated.
3. The product of claim 1 wherein the elastomer is (a) and has homo-
25 geneously distributed therewithin, from 5 to 150 phr, based on 100 parts by weight of (a), of a poly(lower)monoolefin, the olefin having from 2 to 4 carbon atoms.
4. The product of claim 3 wherein the elastomer is (a) and the product has
30 distinct Tgs for each of three phases, attributable to (a) vinylaromatic

hydrocarbon, (b) conjugated diene, optionally hydrogenated, phase, and (c) a polyolefin phase.

5 5. The product of claim 1 wherein the poly(lower)monoolefin has a melt index in the range from 0.2 to 200 gm/10 min at 230°C and 2.16 Kg load, and is combined with from zero to an equivalent amount by weight of a mono(lower)-olefinic rubber having Mn greater than 200,000.

10 6. The product of claim 1 wherein the elastomers (a) and (b) have homogeneously distributed therewithin, from 20 to 180 phr of polybutene, based on 100 parts by weight of (a) or (b), including in addition from 1 to 5 phr, based on 100 parts by weight of (a) or (b), of an additive selected from the group consisting of a non-reinforcing non-reactive filler, stabilizer, processing aid, antiblocking aid, antistatic agent, wax, foaming agent, pigment, and flame
15 retardant.

20 7. The product of claim 1 wherein (a) is a block copolymer having vinyl-aromatic end-blocks and a mid-block selected from the group consisting of polyisoprene, polybutadiene, and hydrogenated copolymers thereof, having blended therein from 30 to 100 phr of polybutene, based on 100 parts by weight of (a), and a compatible amount, from 1 to about 20 phr of a detackifier per 100 parts by weight of (a).

25 8. The detackified product of claim 7 wherein (a) is a triblock copolymer, the vinylaromatic end-blocks are polystyrene, and the mid-block is selected from the group consisting of poly(isoprene) and poly(butadiene), and hydrogenated forms thereof in heterogeneous relative order, including styrene-ethylene-butylene-styrene.

30 9. The detackified product of claim 8 wherein the vinylaromatic end-blocks are polystyrene and the mid-block is selected from the group consisting of

polyisoprene and polybutadiene; and the detackifier is selected from the group consisting of a silicone oil and an epoxidized vegetable oil.

10. The product of claim 6 wherein the polybutene is present in an amount
5 from about 30 to 100 phr respectively, per 100 parts of (a) or (b).
11. The detackified product of claim 8 having a oxygen-permeability in the range from about 2,000 to 20,000 cc.(2.54 μ m)/m².day.atm at 23°C.
- 10 12. The detackified product of claim 8 wherein the polybutene has a number average molecular weight in the range from about 200 to 6000.
13. The detackified product of claim 8 wherein (a) has a number average molecular weight in the range from about 70,000 to about 500,000.
- 15 14. The detackified product of claim 8 wherein (b) has a number average molecular weight in the range from about 70,000 to about 500,000.
15. The product of claim 1 wherein (b) is a blend of polypropylene and
20 ethylene-propylene diene monomer rubber having blended therein from 20 to 180 phr of polybutene, based on 100 parts by weight of (b), and a compatible amount, from 1 to about 20 phr of a detackifier per 100 parts by weight of (b).
16. A closure means comprising an elastomeric sealing element having a
25 thickness in the range from about 0.1 mm to about 10 mm, held in removably sealing relationship with the closure means, for sealing a container against permeation of an oxygen-containing gas, wherein the sealing element is an elastomer selected from the group consisting of (a) a vinylaromatic-polyolefin polyblock copolymer, optionally hydrogenated to provide a block of a
30 mono(lower)olefin, and, (b) a thermoplastic vulcanizate, wherein (a) and (b) each have uniformly distributed therewithin, polybutene fluidizable under melt-

blending conditions of (a) and (b), present in an amount in the range from about 30 to 150 phr, per 100 parts of (a) or (b), the polybutene selected from the group consisting of (i) a homopolymer of polyisobutylene and (ii) a copolymer of isobutene and butene, butene repeating units being present in a
5 minor molar proportion;

the amount of polybutene being sufficient to provide the elastomeric product with a hardness in the range from Shore A 30 to 90 and an oxygen-permeability less than 40,000 cc.(2.54 μ m)/m².day.atm at 23°C;

(a) having a number average molecular weight ("Mn") in the range from about
10 40,000 to 1,100,000; and,

(b) having a tensile strength at 100% elongation in the range from about 0.5 to 10 MPa and specific gravity in the range from 0.9 to 0.99.

17. The closure means of claim 16 wherein (a) is a triblock copolymer having
15 vinylaromatic end-blocks and a mid-block selected from the group consisting of polyisoprene, polybutadiene, poly(lower)olefin, the olefin having from 2 to 4 carbon atoms, and a hydrogenated copolymers thereof; and the sealing element has a hardness in the range form about Shore A 40 to 80, and includes from about 1 to 20 phr of a detackifier.

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18. The closure means of claim 16 wherein the sealing element is light-permeable.

19. The closure means of claim 16 wherein the sealing element is provided
25 by (a) having homogeneously distributed therewithin, from 5 to 150 phr, based on 100 parts by weight of (a), of a poly(lower)monoolefin, the olefin having from 2 to 4 carbon atoms.

20. The closure means of claim 16 wherein the closure means is a bottle cap
30 and the container is a bottle.

21. The closure means of claim 16 wherein the closure means is a stopper and the container is a bottle.

22. A method for providing an essentially oxygen-impermeable elastomeric sealing element comprising blending an elastomer selected from the group consisting of (a) a vinylaromatic-polyolefin polyblock copolymer, optionally hydrogenated to provide a block of a mono(lower)olefin, and, (b) a thermoplastic vulcanizate, wherein (a) and (b) each have uniformly distributed therewithin,

polybutene fluidizable under melt-blending conditions of (a) and (b), present in an amount in the range from about 20 to 180 phr, per 100 parts by weight of (a) or (b), the polybutene selected from the group consisting of (i) a homopolymer of polyisobutylene and (ii) a copolymer of isobutene and butene, butene repeating units being present in a minor molar proportion; and, thermoforming a seal having a hardness in the range from about Shore A 30 to 90 and an oxygen-permeability less than $40,000 \text{ cc.}(2.54 \mu\text{m})/\text{m}^2.\text{day.atm}$ at 23°C .

23. A resin composition which comprises from 100 parts by weight of an elastomer selected from the group consisting of (a) a vinylaromatic-polyolefin polyblock copolymer, optionally hydrogenated to provide a block of a mono(lower)olefin, and, (b) a thermoplastic vulcanizate, wherein (a) and (b) each have uniformly distributed therewithin, polybutene fluidizable under melt-blending conditions of (a) and (b), present in an amount in the range from about 20 to 180 phr per 100 parts by weight of (a) or (b), the polybutene selected from the group consisting of (i) a homopolymer of polyisobutylene and (ii) a copolymer of isobutene and butene, butene repeating units being present in a minor molar proportion; (a) and (b) each having a number average molecular weight ("Mn") in the range from about 40,000 to 1,100,000; and, the resin having a hardness in the range from about Shore A 30 to 90 and an

oxygen-permeability less than 40,000 cc.(2.54 μm)/m².day.atm at 23°C.

24. The resin of claim 22 wherein (a) is a triblock copolymer having vinyl-
5 aromatic end-blocks and a mid-block selected from the group consisting of poly-
isoprene, polybutadiene, and hydrogenated copolymers thereof, and has
homogeneously distributed therewithin, from 5 to 150 phr, based on 100 parts by
weight of (a), of a poly(lower)monoolefin, the olefin having from 2 to 4 carbon
atoms.